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ABSTRACT

Knowing how people learn and why they learn in a specific manner unlocks the mysteries of good teaching. Many learning style differences are related to Piagetian stages of cognitive development. Students' stages of cognitive development may not correspond to their ages and achievements. Piaget also found that many individuals are at different levels of cognitive development in various subject areas. This accounts for contradictions in levels of achievement across the curriculum. Most teachers are unprepared to shift attention from explicit presentations of subject matter to fostering development of abstract thinking and are reluctant to reduce or substitute content despite the implications of Piagetian research. Teachers can determine their students' learning styles by using learning style inventories that define the cognitive, affective, and physiological behaviors of individuals. Knowing how students learn can then help inform good choices by teachers of content, resources, and teaching strategies. With respect to measuring and evaluating systems, rather than emphasizing standard problem solving formats and types of problems, teachers should challenge the students with novel problems that test their understanding. Teachers can make improvements in their instruction when they teach in ways that bring about not only learning in that particular subject, but also cognitive growth. (JRH)

A Piagetian View of Learning Styles

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All teachers, no matter their subject area or the level of abstractions in their subject, are called upon to function in three behaviors. Teachers lecture, ask questions, and lead discussions in pursuit of their craft. Unfortunately, not all teachers function well in all three arenas. For maximum effects a sensitivity to the subtleties of human interaction is required, because teachers can create consonance or dissonance with the learning styles of their students (Grambs and Carr, 1991). Learning is an incredibly complex process involving a great number of decisions by both students and teachers in a relatively short period of time. Teachers constantly are making choices they hope will enable the greatest number of students to learn the greatest amount of material at the same time. Knowing how people learn and why they learn in a specific manner unlocks the mysteries of so called good teaching.

Many learning style differences are related to Piagetian stages of cognitive development (Kurland, 1982). Kurland worked with students in the City College, CUNY, New York, New York medical school preparatory programs. He found that these students were not able to translate verbal sentences involving relationships of power, work, and time into symbolic equations. He also found his students had difficulty relating Avogadro's Number to the mole concept and gram formula weights of substances. What was even more perplexing to him was the difficulty his students had calculating amounts of reactants stated in pounds when given initial amounts stated in grams and balanced chemical equations.

In Piagetian terms, these incidents might be explained by the assertion that the students were still at the concrete operational stage of cognitive development even though their ages and achievement were collegiate level. Despite their age, they were not yet able to deal effectively with abstract concepts. Piaget describes the level of cognitive development at which abstract concepts are handled as being the formal operation level. Hernon (1975) reports that among nonscience major Chemistry students at the University of Indiana, as many as fifty percent were at preformal levels of cognitive development. Piaget found (1973) that many individuals are at different levels of cognitive development in various subject areas.

This accounts for contradictions in levels of student achievement across the curriculum. It is not reasonable for us to expect a high achievement in one course or several courses necessarily to translate into high levels of achievement in all courses a student attempts.

Most teachers are unprepared to shift attention from explicit presentations of subject matter to fostering development of abstract thinking (Herron, 1975). They are reluctant to reduce or substitute course content despite the implications of Piagetian research. Kurland (1982) suggests that a possible answer to the dilemma lies in recognition of the primacy of measuring and evaluating systems. In the three situations at City College discussed earlier, his students' difficulties involved perception of units of measure as mere labels to be employed in specific problem solving formats. Beistel (1975) summarizes this kind of approach as being formal though needing to be based on understanding what exactly one has measured when dealing with abstract notions. Kurland (1982) generalizes that at all stages of the instructional process, efforts must be made to assess the students' abilities to apply understanding to the problem at hand. Teachers must explicitly check students' grasp of terminology and notation of basic verbal and mathematical manipulations as well as their ability to translate verbal statements into symbolic form and vice-versa. Teachers must offer drills in the otherwise obvious or simplistic aspects to assure a sound base for further discussion.

Rather than emphasizing standard problem solving formats and types of problems, teachers should challenge the students with novel problems that test their understanding. Such problems might involve questions such as, why do gas laws require use of Kelvin temperature for proper solution. Teachers might draw parallels between historical or social developments and mathematical models. Kurland (1982) points out that the underlying nature of a system may be lost in general discussions without such considerations of students' understanding.

Gregor (1982) points out that unless teachers consider individual learning styles that develop through nature and nurture, most effective instruction and learning do not occur. He adds that learning styles are more complex than simple Piagetian stages. Teachers can determine their students' learning styles by using learning style inventories that define cognitive, affective, and physiological behaviors of individuals. The results from learning style inventories serve as stable indicators concerning how students perceive,

interact and respond to learning environments. The inventories are not intended as cookbooks for classroom use or as owners' manuals for the brain. Inventories provide information for teachers, helping them organize instruction. Knowing how students learn can help inform good teacher choices of content, resources, and teaching strategies (Grambs and Carr, 1991). Further, accommodation of instruction to individual learning styles does not mean that students should work only in ways for which they are suited. The formal level as described by Piaget develops in an individual in response to experiences and cognitive growth. Therefore, mismatching is an appropriate way to challenge students to stretch their capabilities. Of course, a caution concerning the mismatch involves care not to frustrate the student beyond endurance.

In summary, learning styles are related to many aspects of the individual student. Included in the factors that influence learning styles of many students are the Piagetian level they have reached in the particular cognitive area and subject matter area. Teacher can make real improvements in their instruction when they teach in ways that bring about not only learning in that particular subject, but also cognitive growth.

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